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Zilka-Kotab, PC			AMIN, JWALANT B	
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SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
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Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/804,434	Applicant(s) MORETON ET AL.	
	Examiner Jwalant Amin	Art Unit 2628	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 May 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Terminal Disclaimer

1. The terminal disclaimer filed on 5/23/2006 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of patent number 6,731,298 has been reviewed and is accepted. The terminal disclaimer has been recorded.
2. The rejection of claims 1-17 under double patenting rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Aleksic et al. (US 6,175,368; hereinafter Aleksic), Donovan (6,593,923), Leather et al. (US 6,664,958), Demers et al. (US 6,700,586), and Jenkins (US 6,028,608).

Double Patenting

3. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an

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invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

1. Claims 1, 3 and 4 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 33 of U.S. Patent No. 6,828,980 in view of Donovan et al. (US 6,593,923; hereinafter Donovan).
2. Specifically, it is well established that "Omission of element and its function in combination is obvious expedient if remaining elements perform same functions as before" In re KARLSON (CCPA) 136 USPQ 184 (1963). The above claims in the current application, that is to say all of them, are **broader** in all respects than the reference.
4. To perform analysis required, claim 1 of the current application is compared to claim 33 of Patent No. 6,828,980.

Claim 1: Current Application	Claim 33: Patent No. 6,828,980
A method for computer graphics processing, comprising	A method for computer graphics processing, comprising
modifying a value (x) based on an algorithm	modifying a depth -value of a pixel utilizing the computed depth-direction component of the height parameter (computation corresponds to algorithm)
performing an operation on pixel data taking into account the modified value	performing an operation on the pixel taking into account the modified depth -value
wherein the value is modified utilizing the equation: $x + \Delta(X)$, where Δ includes a value read from a texture map	modifying a depth -value of a pixel utilizing the computed depth-direction component of the height parameter

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As per Karlson, the above-cited claim is identical except for the omission of the elements above. It would have been obvious to one of ordinary skill in the art at the time of present invention to remove the limitations of "depth" above without changing the scope of claim 1 because the added limitation as recited in Patent No. 6,828,980 is an additional feature to claim 33 and thus, is not necessary to determine the value of the plurality of elements of the arrangement pattern.

Although claim 33 of Patent No. 6,828,980 teaches the limitations of claim 1 of the current application, it does not explicitly disclose that the value is modified using the equation: $x + \Delta(X)$, where Δ includes a value read from a texture map. However, Donovan teaches to generate a new depth value z_{light} using the equation: $z_{\text{light}} = z + o$, where $o = m * \text{factor} + r * \text{units}$, where: $m = \max(\text{abs}(\Delta z / \Delta x), \text{abs}(\Delta z / \Delta y))$ (col. 9 lines 31-50, col. 11 lines 10-12 and lines 32-50; the z-slopes ($\Delta z / \Delta x$ and $\Delta z / \Delta y$) are computed from texture coordinates looked up from 2-D dependent texture lookup). Therefore, it would have been obvious to one of ordinary skill in the art at the time of present invention to compute the depth value using the equation as taught by Donovan and use it into the method of claim 33 of Patent No. 6,828,980 because by limiting the depth value within each primitive after the offset operation is performed, the depth ambiguity between objects at different layers can be greatly reduced, and the ghost shadow artifacts may be eliminated very effectively (col. 11 lines 39-43).

Therefore, this claim is properly subject to ODP rejection.

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5. To perform analysis required, claim 3 of the current application is compared to claim 33 of Patent No. 6,828,980.

Claim 3: Current Application	Claim 33: Patent No. 6,828,980
the operation includes a lighting operation	the operation is selected from the group consisting of a hidden surface calculation, a lighting operation, and a shadow mapping operation

Please refer to the ODP rejection of claim 1 for further arguments.

6. To perform analysis required, claim 4 of the current application is compared to claim 33 of Patent No. 6,828,980.

Claim 4: Current Application	Claim 33: Patent No. 6,828,980
modifying is based on a depth-component of the algorithm	modifying a depth-value of a pixel utilizing the computed depth-direction component of the height parameter

Please refer to the ODP rejection of claim 1 for further arguments.

7. To perform analysis required, claim 7 of the current application is compared to claim 33 of Patent No. 6,828,980.

Claim 7: Current Application	Claim 33: Patent No. 6,828,980
the operation includes a hidden surface calculation	the operation is selected from the group consisting of a hidden surface calculation, a lighting operation, and a shadow mapping operation

Please refer to the ODP rejection of claim 1 for further arguments.

8. To perform analysis required, claim 8 of the current application is compared to claim 33 of Patent No. 6,828,980.

Claim 8: Current Application	Claim 33: Patent No. 6,828,980
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the operation includes a shadow mapping operation	the operation is selected from the group consisting of a hidden surface calculation, a lighting operation, and a shadow mapping operation
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Please refer to the ODP rejection of claim 1 for further arguments.

9. To perform analysis required, claim 9 of the current application is compared to claim 33 of Patent No. 6,828,980.

Claim 9: Current Application	Claim 33: Patent No. 6,828,980
the value includes a depth value	modifying a depth -value of a pixel

Please refer to the ODP rejection of claim 1 for further arguments.

Claim Rejections - 35 USC § 112

10. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

11. Claims 1-17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

12. Regarding independent claims 1, 16 and 17, in the equation: $x + \Delta(X)$, where Δ includes a value read from a texture map, on lines 6/7 of the claims, it is not clear if Δ is a function of X or if Δ is multiplied with X . The examiner suggests the applicant to distinctly point out the subject matter of the invention. For the purpose of prior art rejection, the examiner interprets $\Delta(X)$ as a product of Δ and X .

Claim Rejections - 35 USC § 101

13. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

14. Claims 1-17 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

15. Regarding claims 1 and 16-17, the language of the claims raise questions as to whether the claims are directed merely to an abstract idea that is not tied to a technological art, environment or machine which would result in a practical application producing a concrete, useful, and tangible result to form the basis of statutory subject matter under 35 U.S.C. 101. Specifically, the method for computer graphics processing, as disclosed in claim 1, a computer program embodied on a computer readable medium, as disclosed in claim 16, and a system for computer graphics processing are directed to a mathematical procedure, which is an abstract idea that do not correspond to any specific real world data. These claims do not claim any "practical application" or "useful, concrete and tangible result". See MPEP 2106 IV (B)(1).

Regarding claim 16, the examiner suggests to change the language of the claim to "a computer readable medium embodied with a computer program for computer graphics processing".

Claim Rejections - 35 USC § 102

16. The following is a quotation of the appropriate paragraphs of 35

U.S.C. 102 that form the basis for the rejections under this section made in this

Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

17. Claims 1-3, 6, 8, 16 and 17 are rejected under 35 U.S.C. 102(e) as being anticipated by Aleksic et al. (US 6,175,368; hereinafter referred to as Aleksic).

18. Regarding claims 1, 16 and 17, Aleksic (Fig. 1, Fig. 6, col. 3 lines 62-67, col. 4 lines 1-35, col. 9 lines 46-65, col. 10 lines 2-19 and lines 60-67) teaches a method and an apparatus (Fig. 1) for modifying a value (x) (N summed with ΔN) based on an algorithm (addition corresponds to algorithm); and performing an operation (dot product with light vector corresponds to the operation performed on the resulting/modified value) on pixel data taking into account the modified value (N + ΔN); wherein the value (N) is modified utilizing the equation: $x + \Delta (X)$, where Δ includes a value read from a texture map (N + ΔN corresponds to $x + \Delta (X)$); ΔN is obtained by using the coefficient B_u and B_v determined by utilizing the bump map coordinates to access the bump map, which may be a texture map).

19. Regarding claim 2, Aleksic teaches the pixel data includes a normal value (vector N corresponds to the normal value), and further comprising modifying the normal value (N + ΔN ; col. 9 lines 46-65, col. 10 lines 2-19 and lines 60-67).

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20. Regarding claim 3, Aleksic teaches the operation includes a lighting operation (performing a dot product of $N + \Delta N$ with light vector L produces shadowing function for the particular pixel location; this operation corresponds to lighting operation; col. 9 lines 46-65, col. 10 lines 2-19 and lines 60-67).

21. Regarding claim 6, Aleksic teaches the modifying allows the lighting operation to display bumpy shadows (dot product of light vector with $N + \Delta N$ produces a bump shadowing function for the particular pixel; this resulting shadow function is combined with rendered pixel data to produce the resultant display data for the given pixel; this display data displays bumpy shadows; Fig. 6, col. 3 lines 4-9, col. 9 lines 46-65, col. 10 lines 2-19 and lines 60-67).

22. Regarding claim 8, Aleksic teaches the operation includes a shadow mapping operation (desired shadow function; col. 10 lines 8-19).

Claim Rejections - 35 USC § 103

23. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

24. Claims 4-5, 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aleksic, and further in view of Donovan (6,593,923).

25. Regarding claims 4 and 9-11, Aleksic teaches modifying is based on a bump shading component (col. 3 lines 4-6). Although Aleksic teaches the

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claimed limitations as stated above, Aleksic does not explicitly teach modifying based on a depth-component of the algorithm, and the value includes a depth-value, including a clip-space z value and a clip-space w-value. However, Donovan (col. 8 lines 52-54, col. 9 lines 34-50, col. 11 lines 10-17 and lines 35-49; depth value may be referred to a standard z-value and/or w-value; the standard z-value corresponds to clip-space z value, and the standard w-value corresponds to clip-space w-value) teaches to generate the offset depth value Z_{light} based on the depth value z of the screen space using the equation : $Z_{light} = z + o$ (depth value of the screen corresponds to the depth component of the algorithm; the addition operation that gives the depth value Z_{light} corresponds to the algorithm). Therefore, it would have been obvious to one of ordinary skill in art at the time of present invention for clamping the depth value using the depth component of Donovan and use it into the system of Aleksic because by limiting the depth value within each primitive after the offset operation is performed, the depth ambiguity between objects at different layers can be greatly reduced (col. 11 lines 39-43).

26. Regarding claim 5, although Aleksic teaches all of the claimed limitations as stated above, Aleksic does not explicitly teach that modifying allows the lighting operation to display the interaction of displayed objects. However, Donovan teaches to compare the offset depth value Z_{light} with the depth value at the sampling point r , to yield a light-occlusion result $r > Z_{light}$ if the sampled point is behind some objects which are closer to the light, hence it is in the shadow of those objects (col. 2 lines 41-46; Z_{light} corresponds to the modified value; light-

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occlusion result corresponds to displaying the interaction of displayed objects, i.e. shadows in this case). Therefore, it would have been obvious to one of ordinary skill in the art at the time of present invention to allow lighting operation to display shadows of the objects as taught by Donovan and use it into the system of Aleksic because the resultant binary shadow are used to shade the current scanned object, resulting in shadow effects (col. 2 lines 46-48).

27. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aleksic, and further in view of Leather et al. (US 6,664,958; hereinafter Leather).

28. Regarding claim 7, although Aleksic teaches all of the claimed limitations as stated above, Aleksic does not explicitly teach the operation includes a hidden surface calculation. However, Leather teaches to apply the pixel depth values resulting from the z blending operation to a hidden surface removal operation (col. 9 lines 55-67 and col. 10 lines 1-5; hidden surface removal operation corresponds to operation includes a hidden surface calculation). Therefore, it would have been obvious to one of ordinary skill in art at the time of present invention to use the hidden surface removal operation of Leather and apply it into the system of Aleksic because using hidden surface removal operation in conjunction with the z buffer allows the z texture to control whether parts of the texture mapped image are occluded by other objects in the scene (col. 10 lines 3-5).

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29. Claims 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aleksic, and further in view of Demers et al. (US 6,700,586; hereinafter Demers).

30. Regarding claims 12 and 13, although Aleksic teaches all of the claimed limitations as stated above, Aleksic does not explicitly teach that X involves a projection transform, and X includes $(n * T_{proj}[y])$, where $T_{proj}[y]$ includes the projection transform, n includes a vector. However, Demers teaches to transform incoming texture coordinates, geometry or normals pertaining to a surface in object space into projected texture coordinates in homogeneous eye space (col. 8 lines 10-24, col. 9 lines 12-61; matrix transformation producing projected texture coordinates corresponds to projection transformation of the incoming texture coordinates or normals; normals $[N_x, N_y, N_z]$ corresponds to vector; the dot product calculation between the normals and the matrix corresponds to $(n * T_{proj}[y])$). Therefore, it would have been obvious to one of ordinary skill in art at the time of present invention to produce projected texture coordinates in homogeneous (eye) space using matrix transformation as taught by Demers into the system of Aleksic because matrix transformation could be used for any type of texturing dependent on the geometry of the object (e.g. environment mapping, reflection mapping, etc) (col. 10 lines 65-67 and col. 11 lines 1-5).

31. Claims 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aleksic and Demers, and further in view of Jenkins (US 6,028,608).

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32. Regarding claims 14 and 15, although the combination of Aleksic and Demers teach all of the claimed limitations as stated above, they do not explicitly teach y equals three and y equals four. However, Jenkins teaches a case when viewpoint motion vector is parallel to view direction vector, object space x and y values are constant while z value varies (col. 53 lines 56-67, col. 54 lines 38; constant y corresponds to $y=3$ or $y=4$). Therefore, it would have been obvious to one of ordinary skill in art at the time of present invention to use constant values of y as taught by Jenkins into the system of Aleksic and Demers because these method gives exact results requiring fewer floating point operations than the floating point operations required for multiplication of a vector $[x \ y \ z]$ by a general transformation matrix, and reduce the cost of transformation-projection (col. 54 lines 20-23 and lines 29-34).

33. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jwalant Amin whose telephone number is 571-272-2455. The examiner can normally be reached on 9:30 a.m. - 6:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Zimmerman can be reached on 571-272-7653. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

*** J.A. 3/29/07



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